

Ageing EBS Walleye Pollock stocks

Age & Growth Program – Alaska Fishery
Science Center – Seattle, WA



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OVERVIEW

1. Business practices of production ageing
2. Methods of ageing pollock
3. Total number EBS pollock aged
4. Quality Control (precision) Bering Sea
5. Ageing problems.
6. Pollock growth and growth variability
7. Walleye pollock validation work at AFSC

Age and Growth (Ageing production process)

Age validation & life history studies

Scientific Activities

Age determination & growth studies

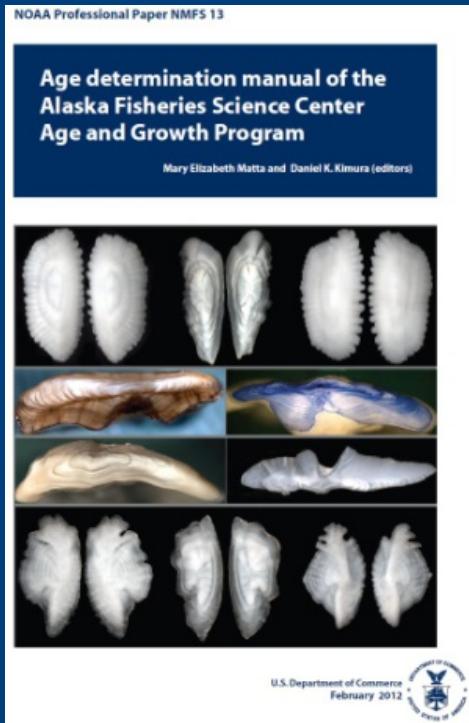
Support Activities

Reading forms

- Age validation (^{14}C , ^{18}O , $^{226}\text{Ra}/^{210}\text{Pb}$)
- Growth/life history variability
- Essential habitat (otolith microchem)

Inform age determination

Publications



Report to requestor

Reader age



20% random subsample

Tester age

Final age

Discrepancy Program
Agree Program

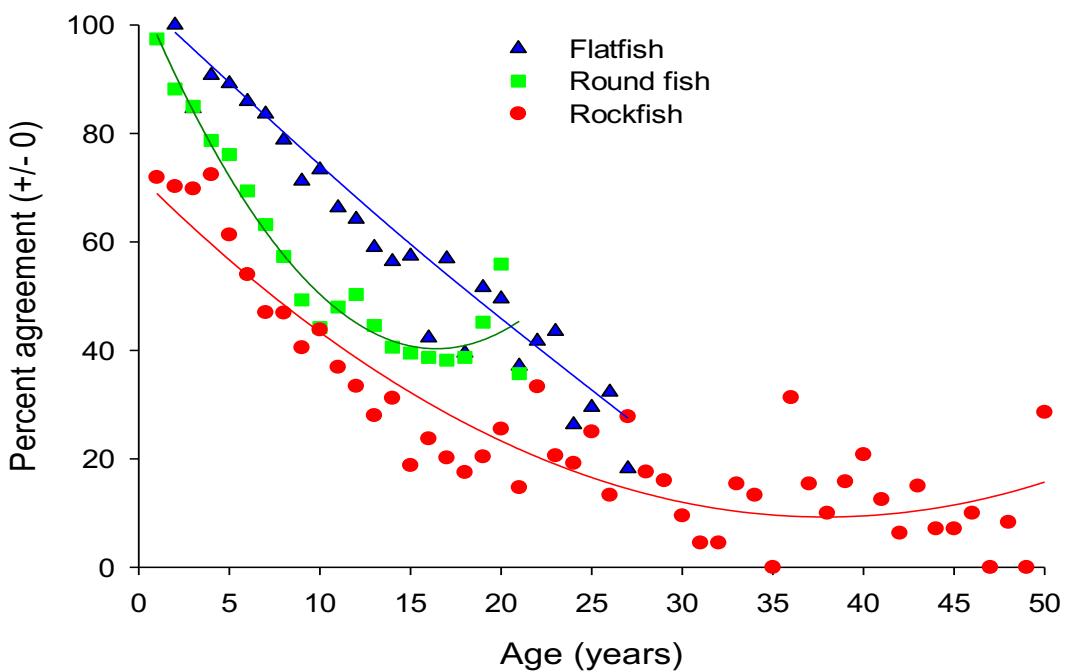
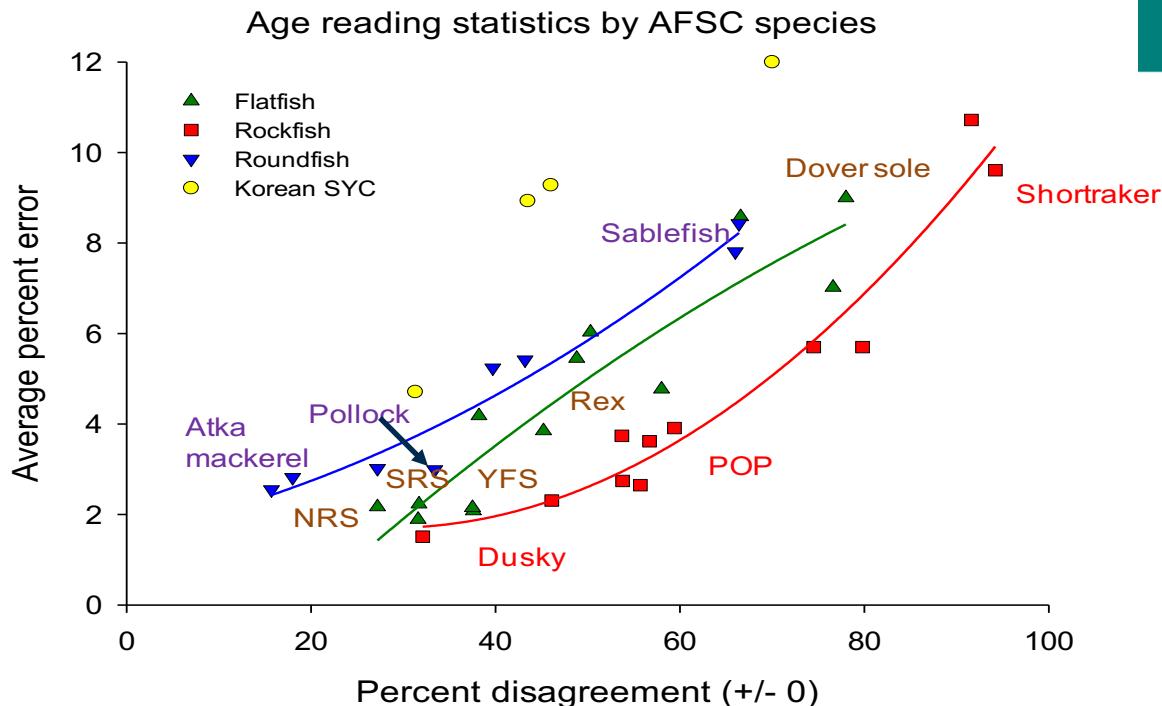
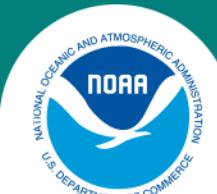
PE
CV
APE
Statistical precision
symmetry (bias)



Distribution Databases

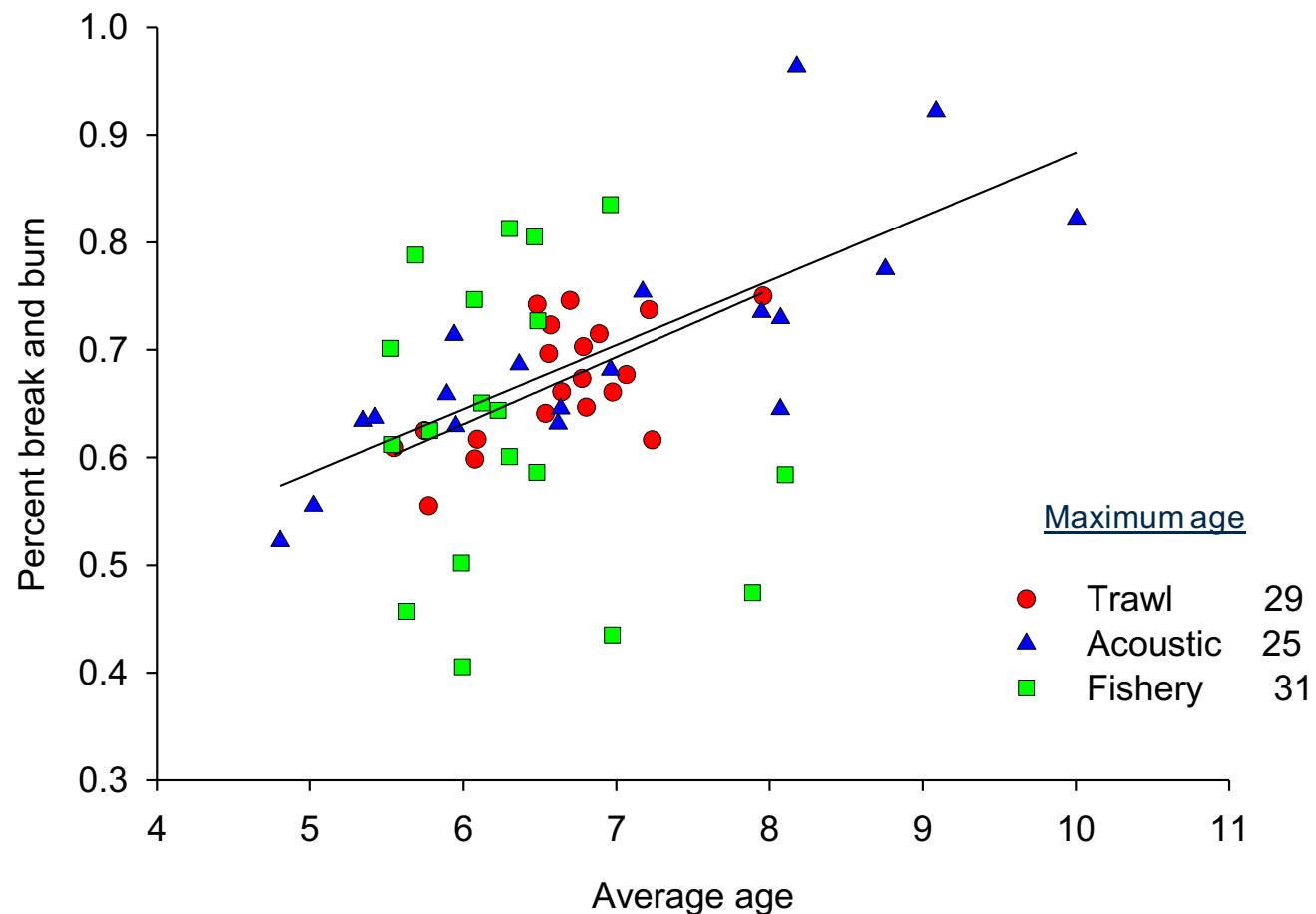
- RACEBASE
- NORPAC
- QAQC Reports (Requestor)
- Web tools

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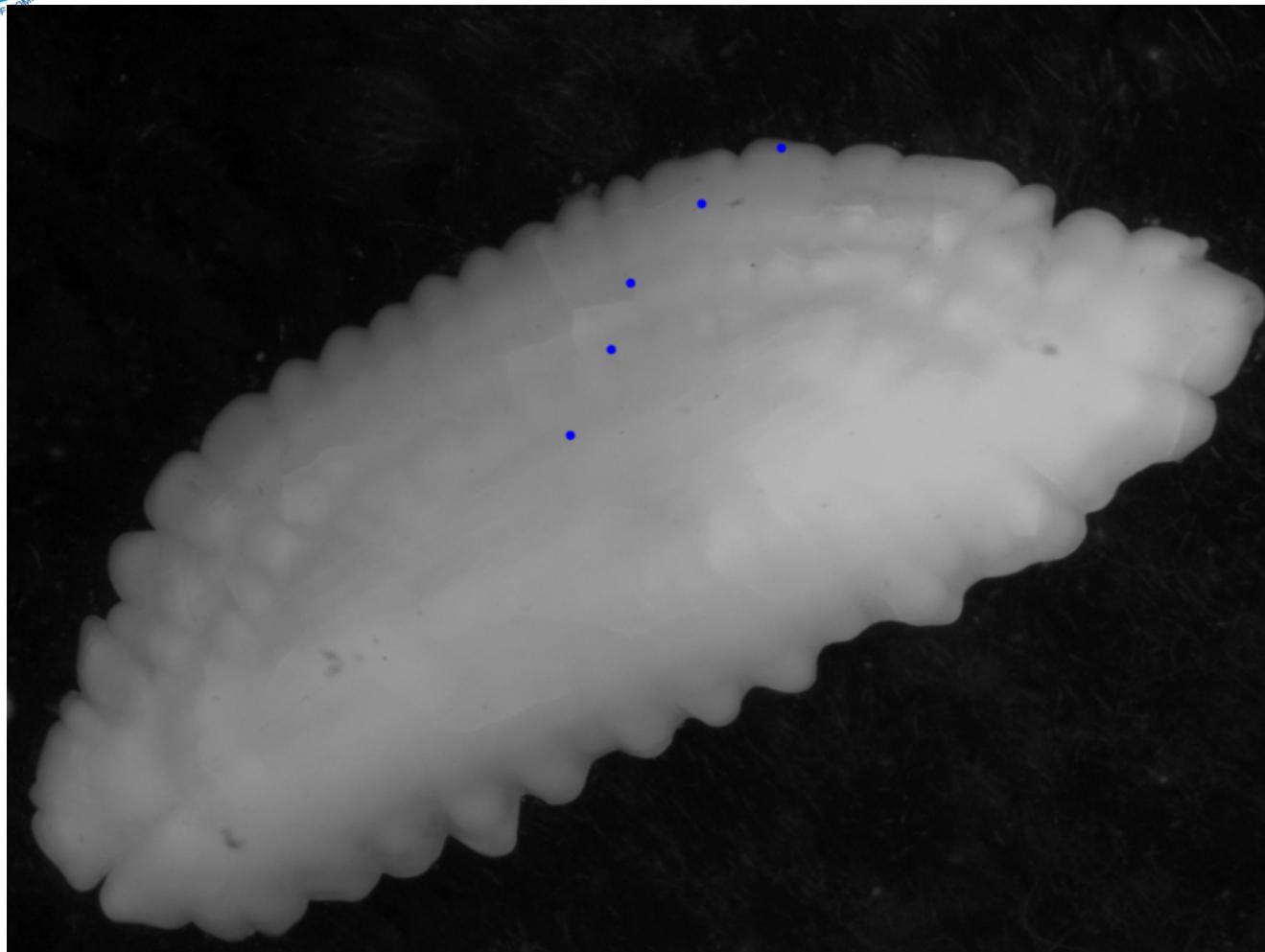


Otolith preparation methods (percent break and burn vs. average age) 1991 - 2015





Some walleye pollock otoliths can be aged from the surface.





Walleye pollock otolith being sawed

Modeling clay in custom-made Isomet saw chuck holds the otolith in place during the sawing process





Walleye pollock otolith being burned over ethanol flame

Otoliths can also be baked in a toaster oven rather than burned using an ethanol flame. The choice of pattern enhancement is left to the discretion of the Reader ageing the sample.



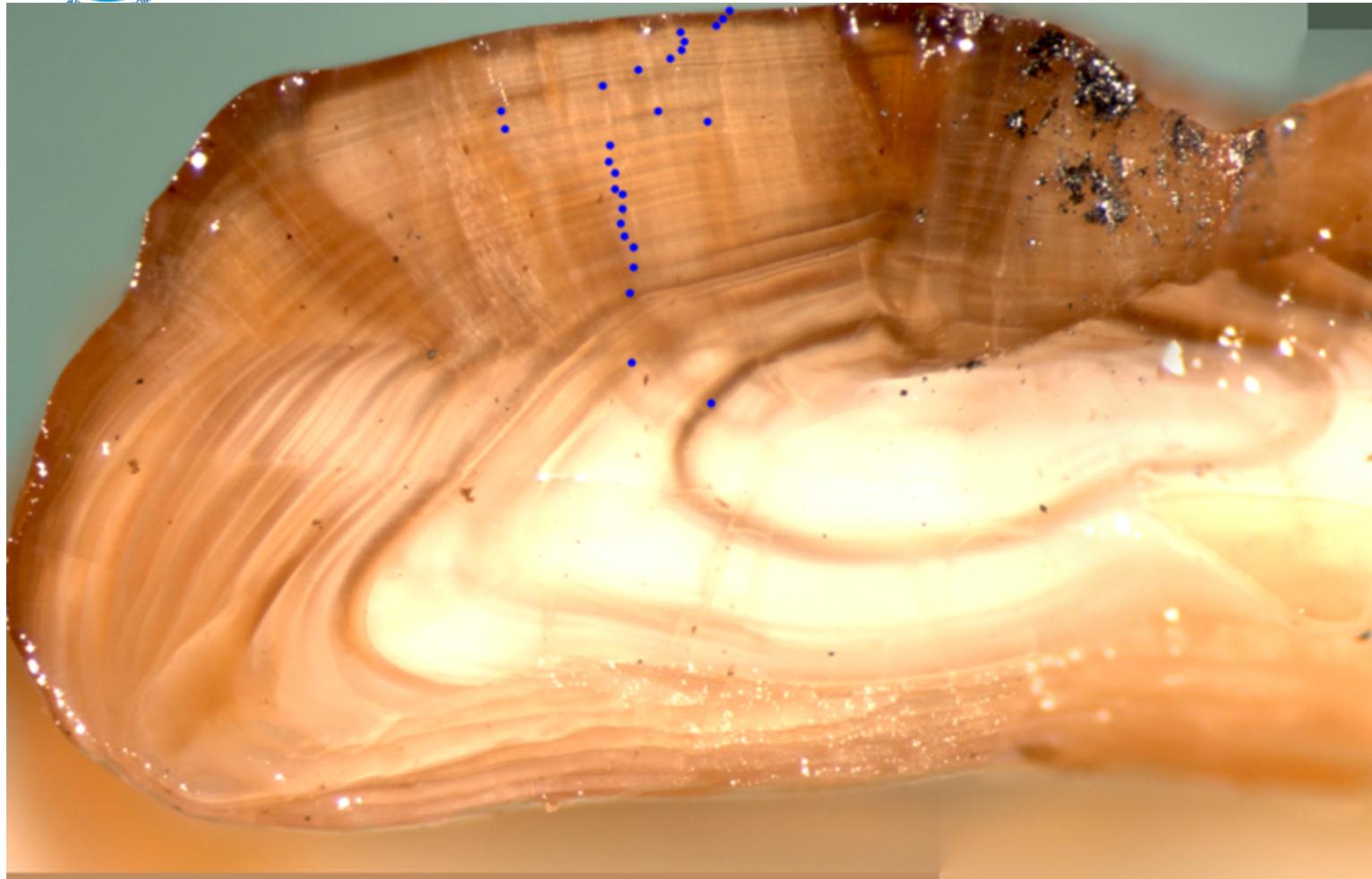


7 year old Walleye pollock break-and-burn

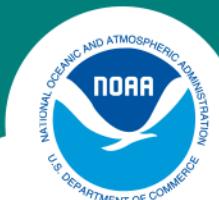




~26 year old Walleye Pollock break-and-burn



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The good



The bad

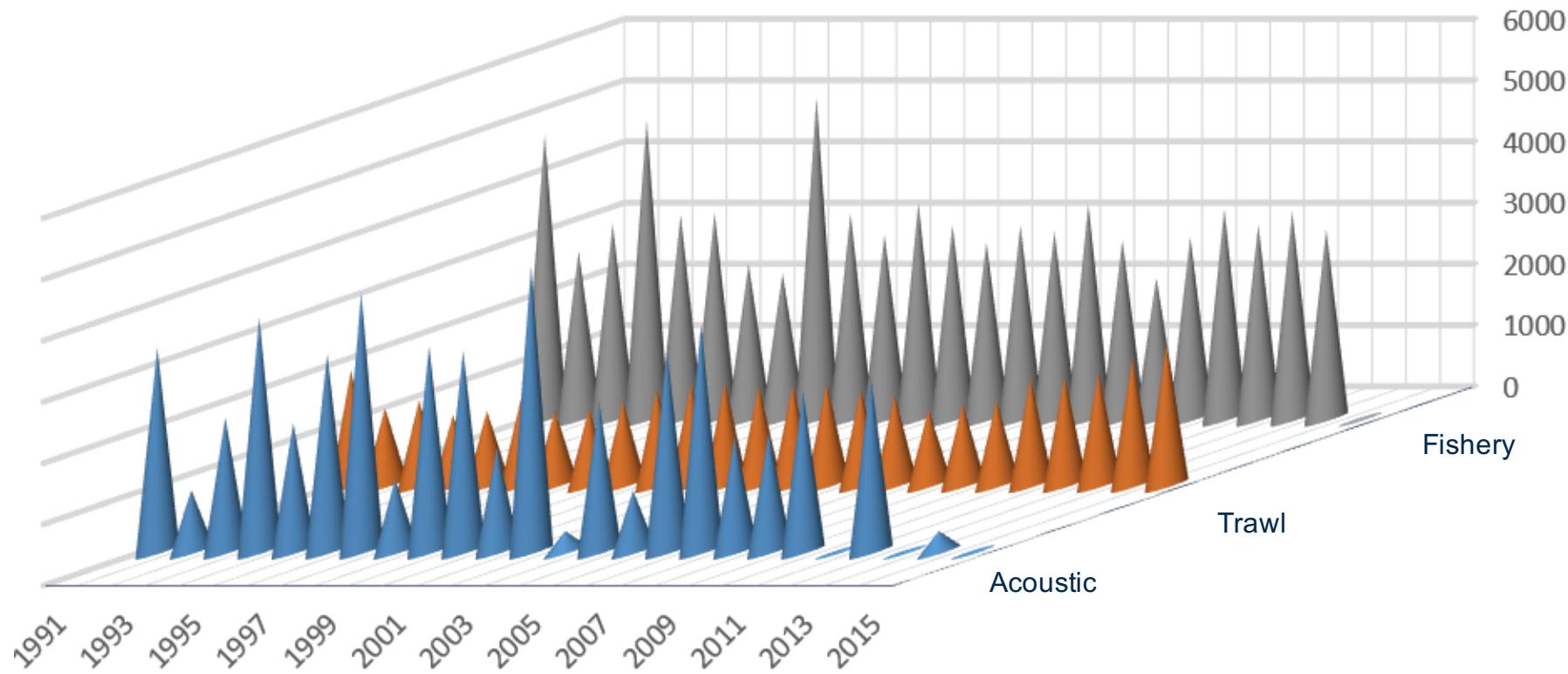


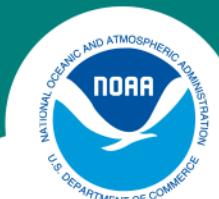
The ugly



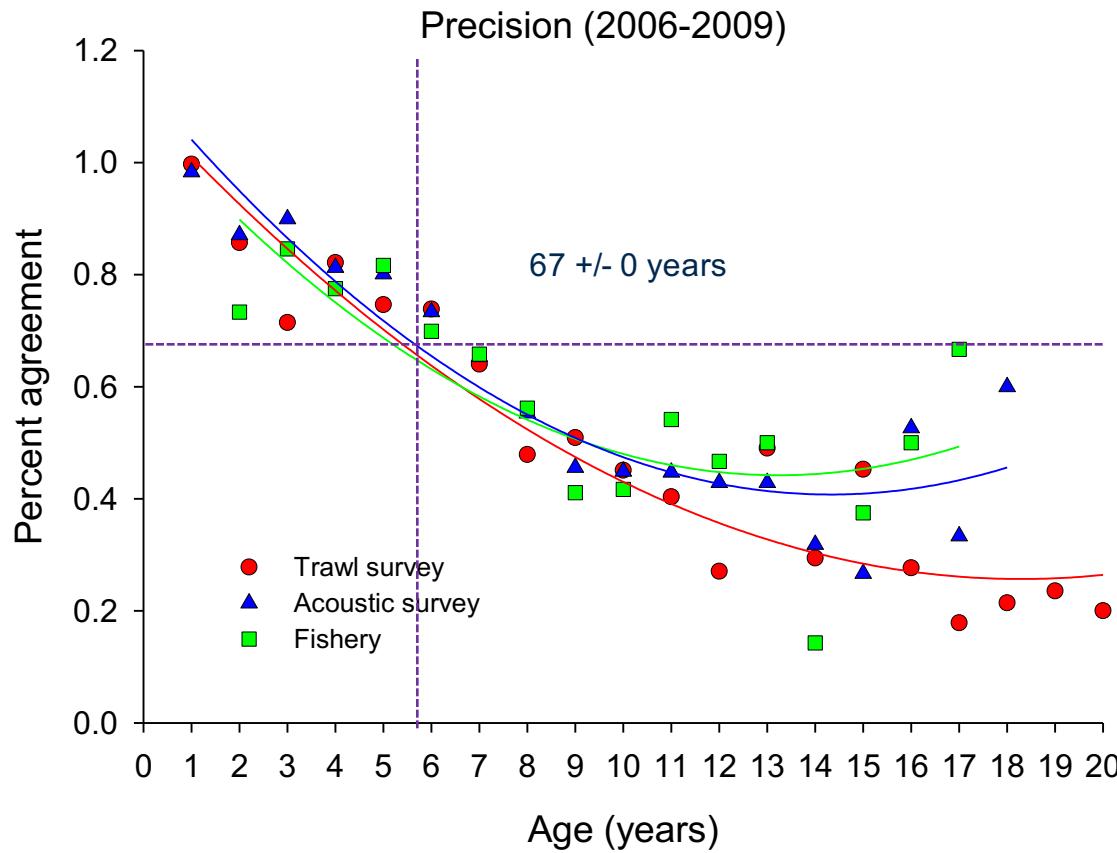


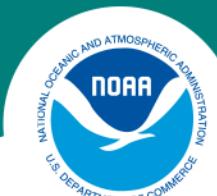
Total EBS Walleye Pollock Aged 1991 - 2015



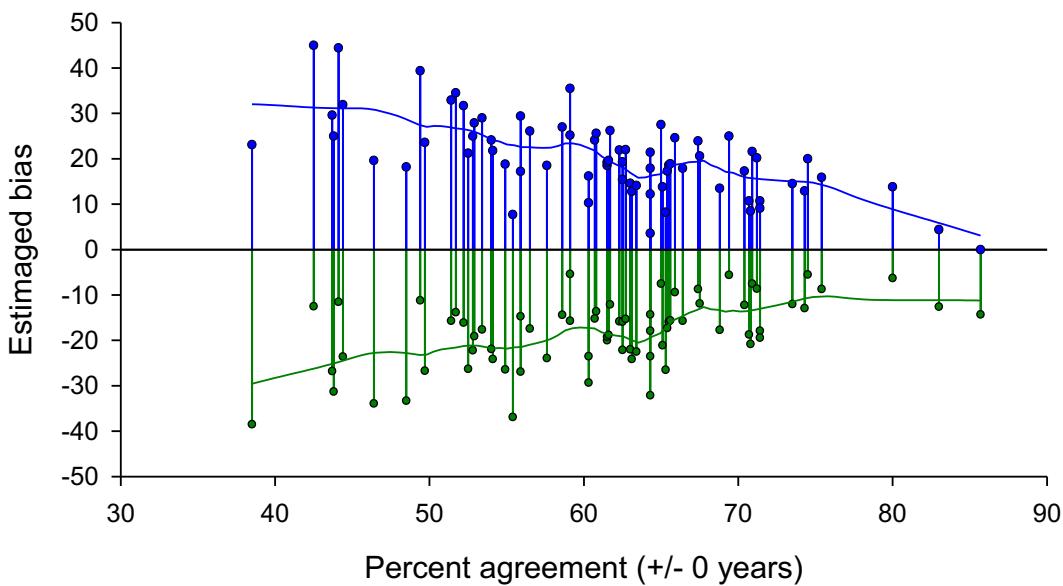
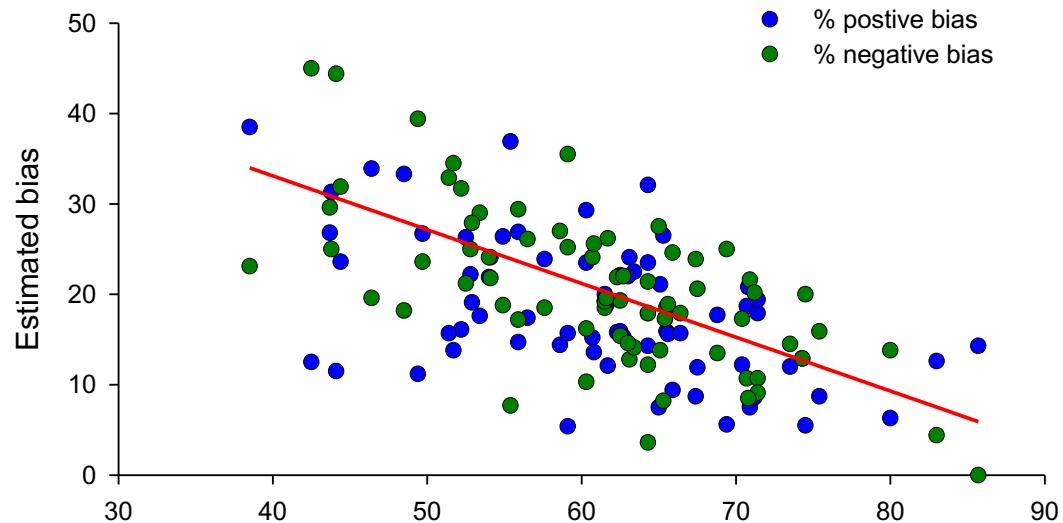


Quality Control Statistics (precision) 2006-2009





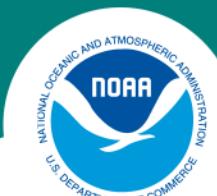
Relative bias ("consistency of age estimation")





Bering Sea/EBS Walleye Pollock Ageing Problems

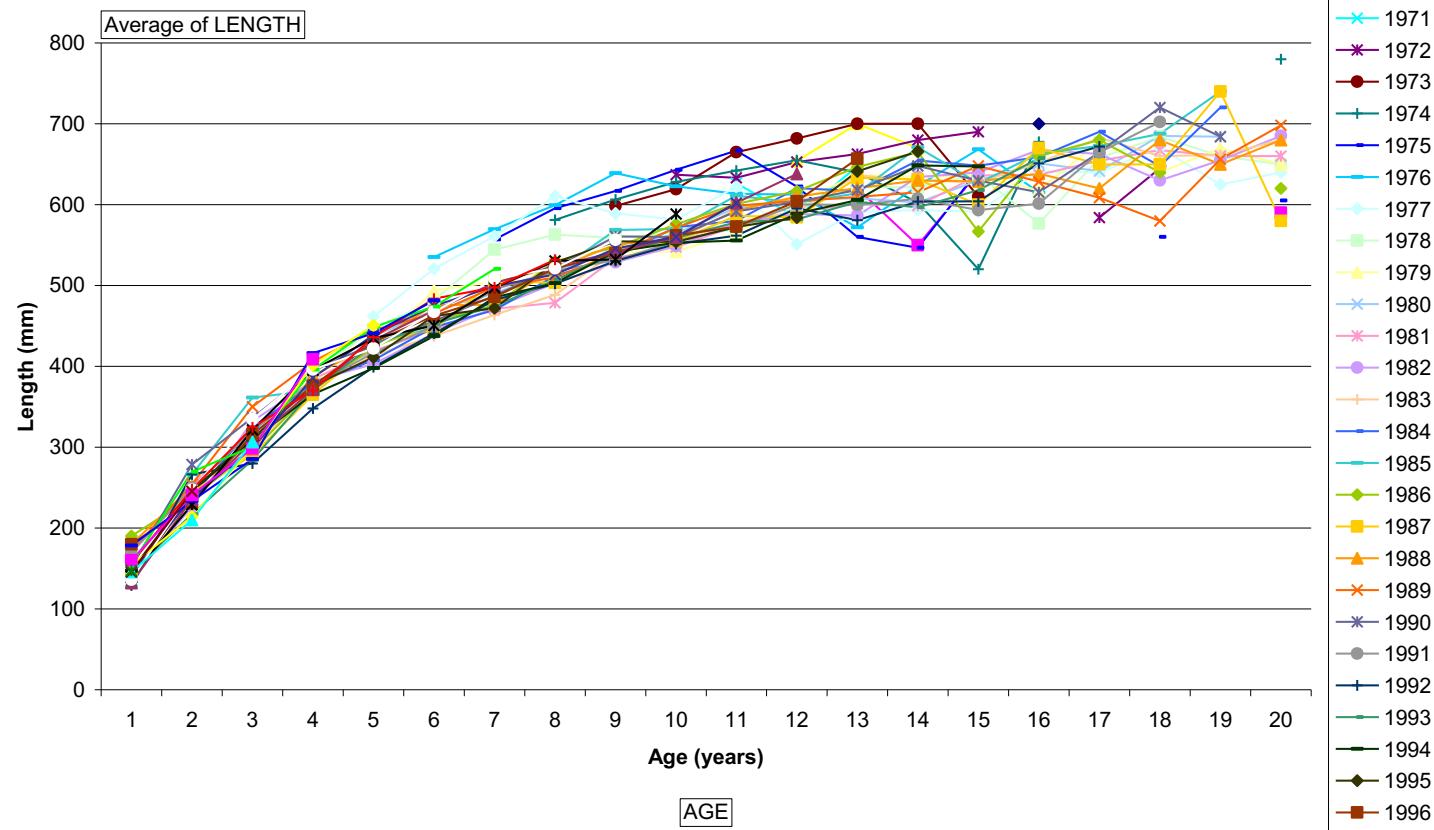
1. Variability in the size of the first year.
2. Vague/difficult patterns.
3. Variability in the timing of growth increment deposition between years.
4. Since 2010 all samples stored in glycerine/thymol.
5. Timing of otolith hydration prior to ageing affects ageability of surface.

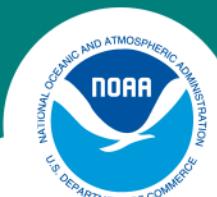


SEX 1

Pollock growth

Mean length at age by cohort

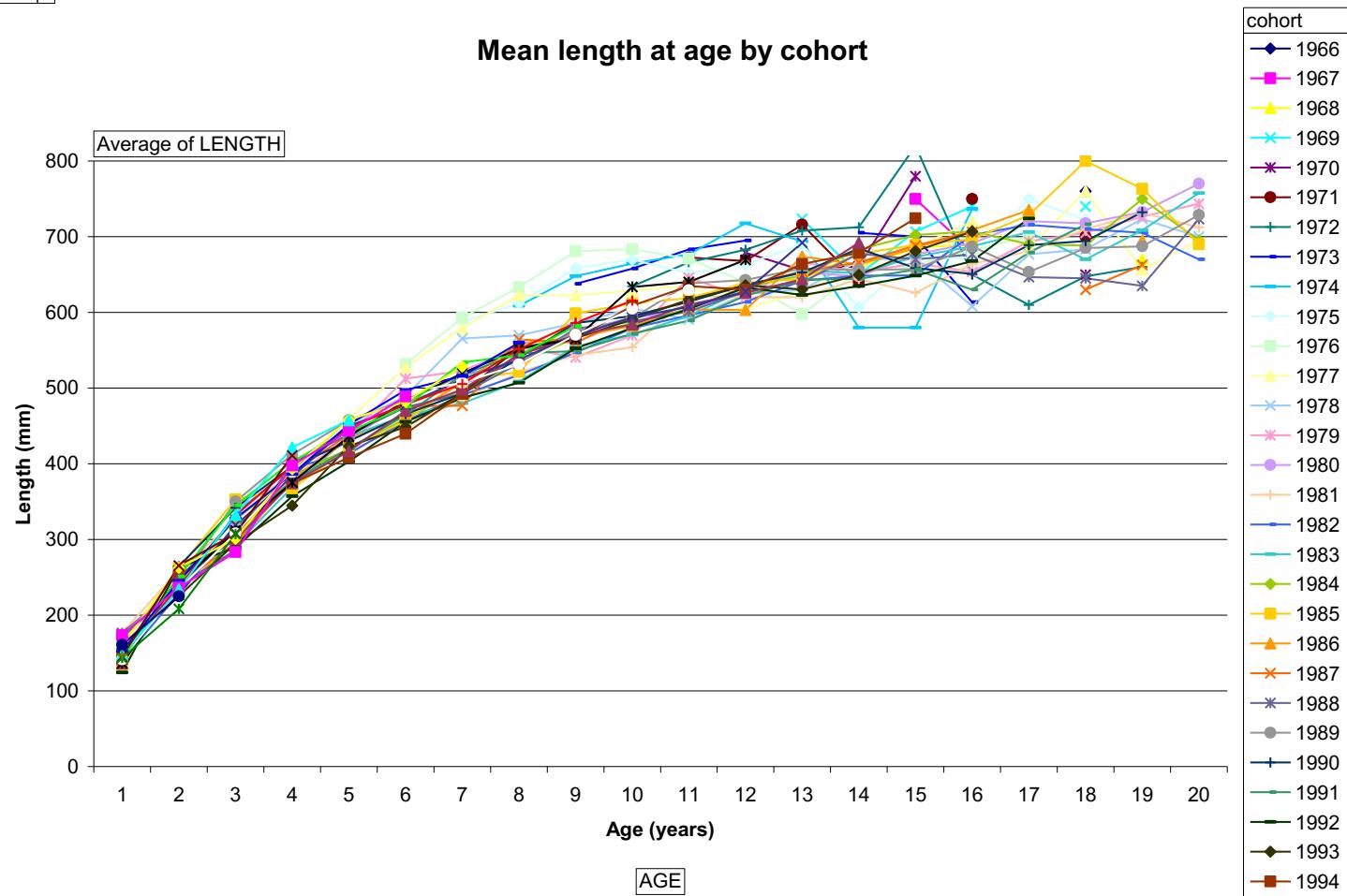


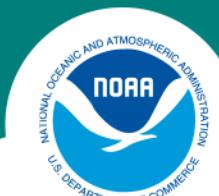


SEX 2

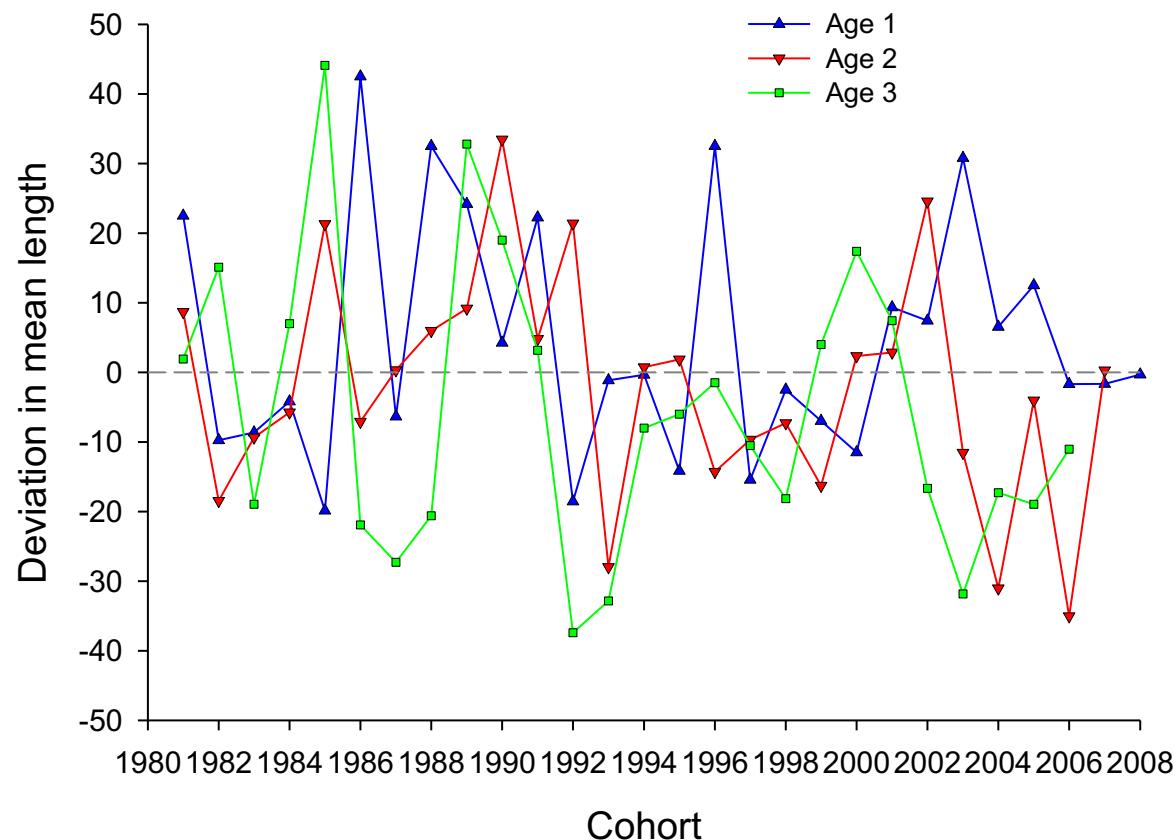
Pollock growth

Mean length at age by cohort



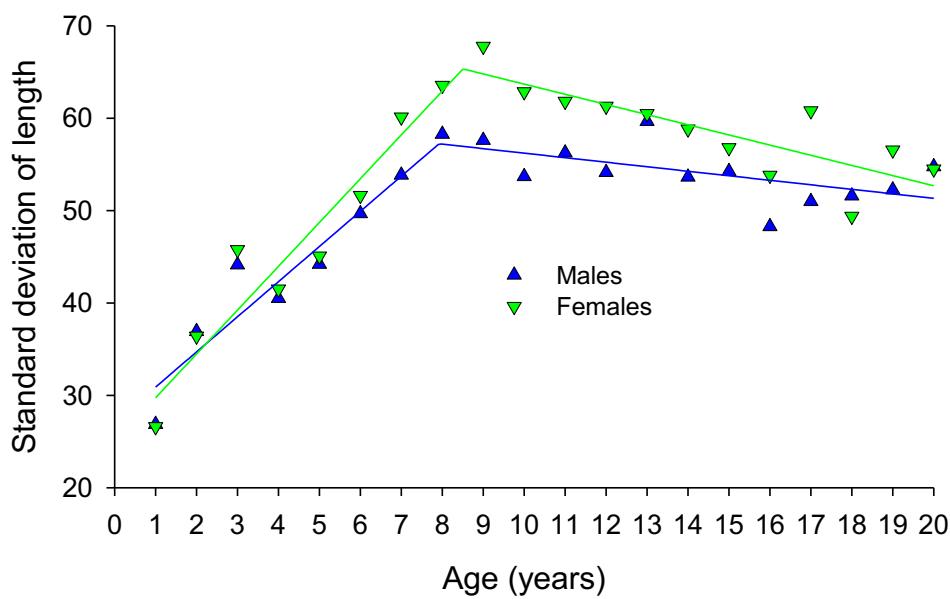
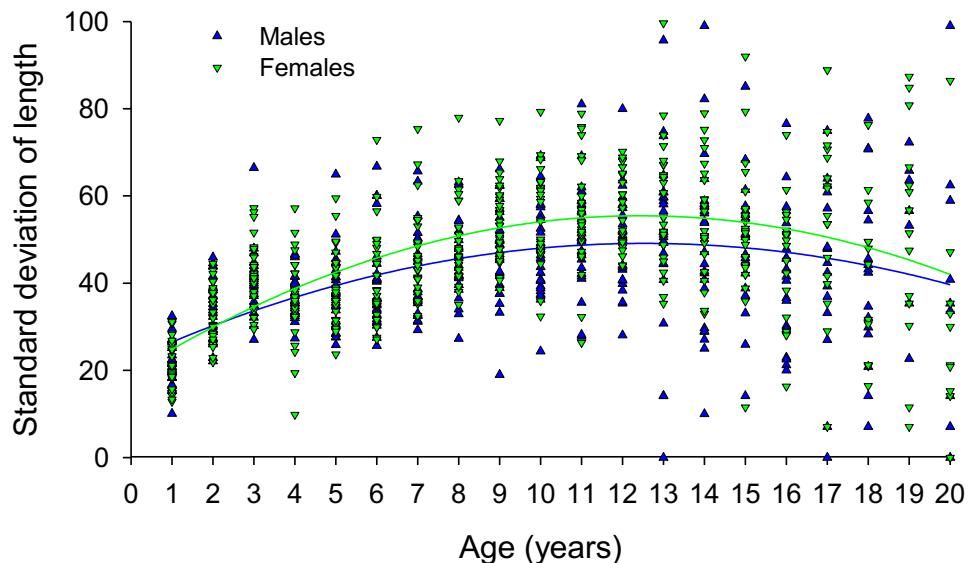


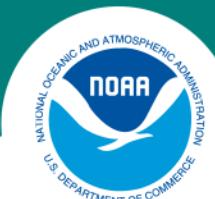
Pollock growth variability



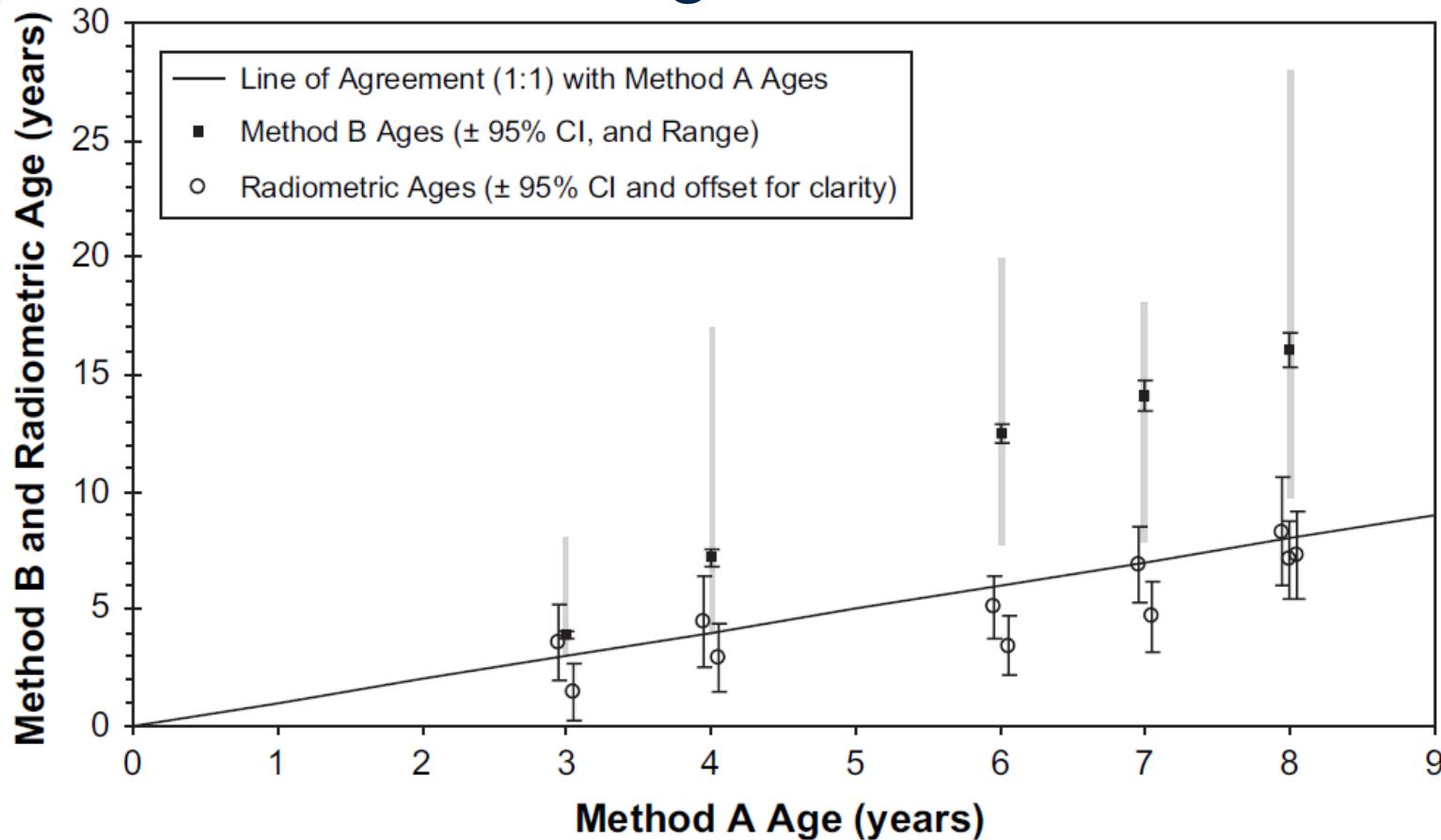


Pollock growth variability

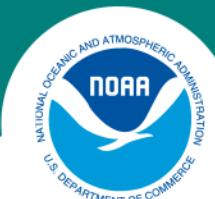




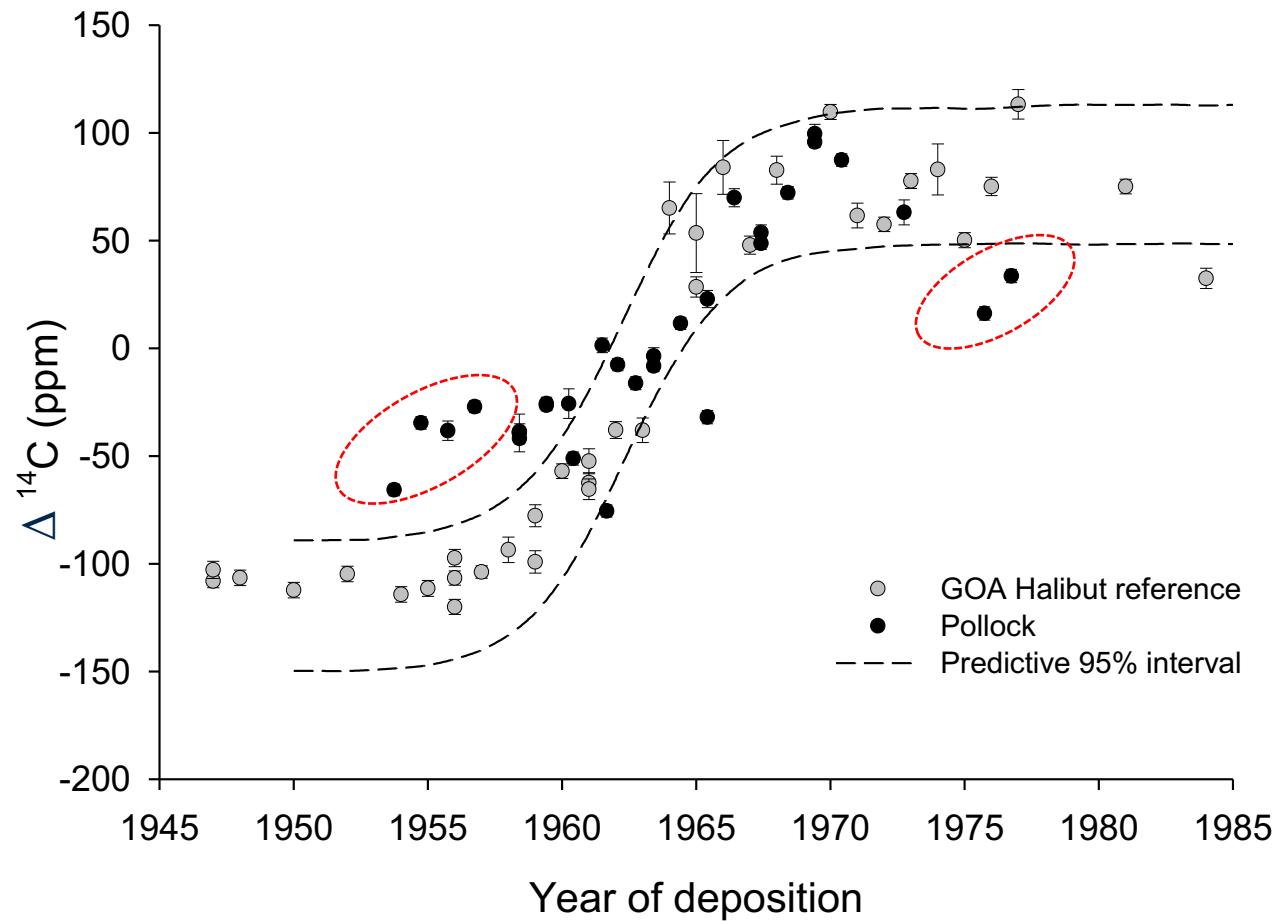
Pb:Ra age validation



Kastelle, C.R., and D.K. Kimura. 2006. Age validation of walleye pollock (*Theragra chalcogramma*) from the Gulf of Alaska using the disequilibrium of Pb-210 and Ra-226. ICES. J. Mar Sci. 63: 1520-1529.



$\Delta^{14}\text{C}$ radiocarbon (preliminary)





Walleye Pollock Validation Work at AFSC

Kimura, D.K., J.J. Lyons, S.E. MacLellan, and B.J. Goetz, 1992. Effects of year-class strength on age determination. *J. Mar. and Freshwater Res.* 43:1221-1228.

Kimura, D.K., C.R. Kastelle, B.J. Goetz, C.M. Gburski, and A.V. Buslov. 2006. Corroborating ages of walleye pollock (*Theragra chalcogramma*). *J. Mar. and Freshwater Res.* 57: 323-332.

Kastelle, C.R., and D.K. Kimura. 2006. Age validation of walleye pollock (*Theragra chalcogramma*) from the Gulf of Alaska using the disequilibrium of Pb-210 and Ra-226. *ICES. J. Mar Sci.* 63: 1520-1529.

Two international workshops to arrive at the best way of ageing walleye pollock:
Gdynia, Poland 1990; Seattle, WA 1998.